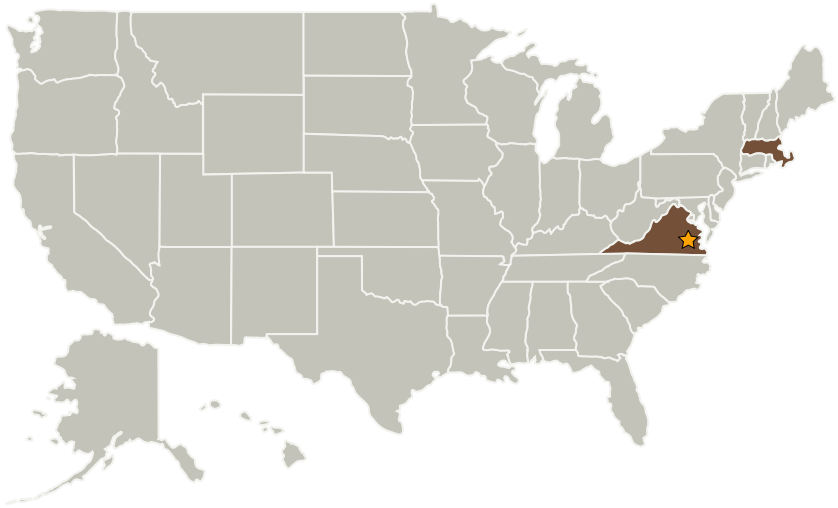
Long Duration Space Shelter Shielding, Phase II

Completed Technology Project (2009 - 2011)

Project Introduction

Physical Sciences Inc. (PSI) has developed a ceramic composite material system that is more effective for shielding both GCR and SPE than aluminum. The composite technology enables a modular, multifunctional building system for lunar habitats that can keep equivalent doses received by astronauts below the 150 mSv exposure limit during a 90 day lunar mission. During Phase I, we achieved TRL 3 by demonstrating that our ceramic composite material is superior to aluminum in radiation shielding applications using HZETRN code calculations and radiation exposure experiments on material test samples. The Phase II SBIR effort will advance our ceramic composite to TRL 5 by... 1) Performing detailed shielding calculations using OLTARIS for a proposed shelter wall design 2) Demonstrating fabrication methods that produce material with consistent mechanical, electrical and thermal properties 3) Using radiation exposure experiments to verify shielding performance We will design and analyze a lunar habitat wall system using our ceramic composite material as the primary structural member. We will fabricate and strength test our ceramic composite materials to demonstrate that the ceramic composite system is a viable structural material for lunar habitats. We will demonstrate that the ceramic composite system will provide at least 20% greater radiation shielding effectiveness against GCR and SPE than an aluminum structure of comparable mass.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Virginia

Project Transitions

November 2009: Project Start

May 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.1 Thermal Protection Materials